

## ABSTRACT

The present invention provides a voltage-current converting circuit which is capable of varying a gain in a wide range without a switching circuit by  
5 applying a control voltage to a single control terminal. The voltage-current converting circuit is comprised of a parallel circuit including positive resistors R1 and R2, and transistors Q3 and Q4 each acting as a negative resistor, and electrically connected in parallel with the positive resistors R1 and R2, and transistors Q1 and Q2 each carrying out voltage-current conversion and  
10 electrically connected in series to the parallel circuit. A variable voltage source VV is electrically connected between the transistors Q3, Q4 and a ground. By controlling a voltage of the variable voltage source VV, resistances of the transistors Q3 and Q4 are controlled. By varying a voltage of the variable voltage source VV, resistances of the transistors Q3 and Q4 vary, resulting in that  
15 a voltage between a gate and a source in the transistors Q1 and Q2 varies, and thus, a mutual conductance  $g_m$  of the voltage-current converting circuit varies.